Amendments to the Claims: This listing of claims will replace all prior versions, and listings, of claims in the application. Indicated changes are with respect to the Preliminary Amendment mailed on February 25, 2003 and filed on March 4, 2003:

Listing of Claims:

Claims 1-40 (canceled)

Claim 41 (currently amended) In apparatus for irradiating a selected region of a target material containing an excitable species in order to ~~excite~~ produce a state of excitation in members of said species, including a source of exciting radiation adapted to ~~exciting~~ producing a state of excitation in said members and focusing means to focus said radiation to said selected region, a method of increasing the resolution of said apparatus including the steps of:

providing a second type of radiation able to reduce ~~the~~ said state of excitation ~~of said species by said exciting radiation~~; and

applying said second type of radiation preferentially to a chosen part of said selected region such that the net intensity of said second type of radiation on at least one point in said selected region is substantially zero, except radiation of said second type arriving on said point because of optical imperfections not feaasable to completely eliminate, such as scattering and reflection within said apparatus and said material, ~~to said selected region to preferentially decrease the excitation in a chosen part of said region; and~~

~~reducing the net intensity of said second type of radiation on at least one point in said selected region to substantially zero, except radiation of said second type arriving on said point from sources such as scattering and reflection within said apparatus and said material, not feasible to completely eliminate,~~ thereby increasing the resolution of said apparatus.

Claim 42 (currently amended) The method in Claim 41, wherein the step of applying said second type of radiation preferentially to a chosen part of ~~reducing the net intensity of said second type of radiation on at least one point in said selected region to~~ said selected region such that the net intensity of said second type of radiation on at least one point in said selected region is substantially zero includes the additional steps of providing a first source of said second type of radiation directed on said point, and providing a second source of said second type of radiation directed on said point, coherent with said first source, and adapted to destructively interfere, at said point, with the radiation from said first source of said second ~~time~~ type of radiation.

Claim 43 (currently amended) The method in Claim 41, including the additional step of producing a first interference pattern of said second type of radiation within said selected region such that said pattern is oriented so as to lead an increase of resolution primarily in a first direction.

Claim 44 (canceled)

Claim 45 (currently amended) The method of ~~Claim 44~~ Claim 43 including the additional step of producing a second interference pattern of said second type of radiation within said region, such that said second interference pattern ~~has at least one node substantially extended in at least one dimension different from said first dimension in Claim 44~~ is oriented so as to lead to an increase of resolution primarily in a second direction, different from said first direction and including a step of reducing interference between radiation of said second type in said first interference pattern and radiation of said second type in said second interference pattern.

Claim 46 (canceled).

Claim 47 (currently amended). The method of ~~Claim 46~~ Claim 45, wherein said step ~~providing that~~ reducing interference between radiation of said second type in said first interference pattern ~~substantially does not interfere with radiation of said second type~~ and in said second interference pattern includes a step from the class including

producing said interference patterns at different times,

producing said interference patterns from radiation of different wavelengths,

producing said interference patterns from mutually incoherent radiation, and

producing said interference patterns from mutually coherent radiation but having a phase difference of substantially (90 + n(180))° where n is an integer.

Claim 48 (currently amended). The method of Claim 45, wherein said focusing means has an axis, ~~wherein the radiation from said first interference pattern increases resolution in a first direction substantially perpendicular to said axis, and wherein the radiation from said second interference pattern increases resolution in a second direction both substantially perpendicular to said axis and also different from said first direction.~~ and wherein said first direction and said second direction are both substantially perpendicular to said axis.

Claim 49 (currently amended). The method of Claim 45, wherein said focusing means has an axis, wherein ~~the radiation from said first interference pattern increases resolution in a~~ said first direction is substantially perpendicular to said axis, and wherein said ~~the radiation from said second interference pattern increases resolution in a~~ second direction is substantially parallel to said axis.

Claim 50 (original). The method of Claim 41 wherein said focusing means has an axis, and including means to improve resolution in two mutually perpendicular dimensions perpendicular to said axis and additional means to improve resolution in the dimension parallel to said axis.

Claim 51 (currently amended). The method of Claim 41 wherein said ~~radiationally~~ excitable species ~~are~~ is in a class including:

fluorescent molecules in a target material to be examined;

molecules in a target material to be examined that can emit radiation following excitation;

particles in a target material to be examined that can emit radiation following excitation;

molecules in a target material consisting of a recording medium encoding information;

molecules in a target material adapted to undergo a long term change in at least one property following exposure to said exciting radiation; and

molecules in a photolithographic resist.

Claim 52 (currently amended). The method of Claim 41 wherein said apparatus is adapted to simultaneously image a plurality of regions in said target material, and wherein said step ~~directing~~ applying said second type of radiation ~~on~~ to said material is adapted to create an interference node in each of said regions.

Claim 53 (currently amended). The method of Claim 41, and including additional steps of ~~measuring~~ providing a radiation detector to measure radiation emitted by the irradiated portion of said material and of substantially preventing said second type of radiation from being included in the measurement of the radiation emitted by the irradiated portion of said material, and wherein said step of substantially preventing said second type of radiation from being included in the measurement includes a step from a class including,

using an optical filter substantially opaque to said radiation of said second type, said filter being located in the optical path between said target material and said radiation detector,

delivering said exciting radiation in short pulses and delivering said second type of radiation in short pulses which follow said pulses of exciting radiation, and

gating the measurement off during said short pulses of said second type of radiation.

Claim 54 – 55 (cancelled).

Claim 56 (currently amended). The method of Claim 41, wherein said species has an excitation spectrum with at least one band where radiation of a wavelength within said band produces substantially no excitation of said species, and including the step of substantially preventing ~~the~~ said second type of radiation from exciting said members by the step of providing the second type of radiation of a wavelength within said band.

Claim 57 (currently amended). The method of Claim 41 wherein said exciting radiation produces a state of excitation in said ~~excites~~ members of said species by a multi-photon process.

Claim 58 (currently amended) The method of Claim 41 wherein said exciting radiation is directed simultaneously to a plurality of ~~points~~ non-adjacent regions of said material ~~are imagined simultaneously~~.

Claim 59 (currently amended). In apparatus for irradiating a selected region of a target material containing an excitable species in order to excite members of said species, including a source of exciting radiation adapted to excite said members and focusing means to focus said radiation to said selected region, ~~mean~~ means for increasing the resolution of said apparatus including:

means for providing a second type of radiation able to reduce the excitation of members by said exciting radiation; and

means for directing said second type of radiation to said selected region so as to preferentially decrease the excitation in a chosen part of said region, and such that the intensity of said second type of radiation on at least one point in said region is substantially zero, thereby increasing the resolution of said apparatus.

Claim 60 (currently amended). In apparatus for irradiating a selected region of a target material containing a radiationally excitable species in order to excite members of said species, including a source of exciting radiation adapted to excite said members and focusing means to direct said radiation to a said region, means for increasing the effective resolution of said focusing means including:

means for providing a second type of radiation able to reduce the excitation of said species by said exciting radiation; and

means for shaping said second type of radiation into a pattern projected into said region, said pattern containing at least one point where the intensity of said second type of radiation is as close to zero as is reasonably feasible, in view of limitations due to imperfections in the optical system, including scattering and spurious reflections.

Claim 61 (new). The apparatus described in Claim 60, wherein the means for shaping said second type of radiation into a pattern projected into said region includes means for providing at least two mutually coherent beams of said second type of radiation directed on said point, so that at said point, the radiation from said beams is out-of-phase and cancels, and such that, on a line between said point and said focusing means, at locations near said point, the intensity of said second type of radiation generally increases with distance from said point, thereby increasing resolution in the axial dimension.

Claim 62 (new). The apparatus described in Claim 60, including means producing two mutually coherent beams of said second type of radiation and directing said beams in a generally axial direction so that there is destructive interference at said said point where the intensity is as close to zero as reasonably feasible, such point being made to substantially coincide with the point of greatest intensity of said exciting radiation, and such that along an axial direction, near these two points, the intensity of said second type of radiation generally increases with distance from those points, thereby increasing the axial resolution of said apparatus.

Claim 63 (new). The apparatus described in Claim 60 wherein said focusing means produces a point of maximum intensity of said exciting radiation within said region, wherein said point of substantially zero intensity of said second type of radiation substantially coincides with said point of maximum intensity, and wherein in said pattern, in the axial dimension, the intensity of said second type of radiation generally increases with distance from that point of zero intensity, thereby increasing resolution in the axial dimension.

Claim 64 (new). The method in Claim 41 including the additional steps of providing a single laser, splitting the output of that laser into at least two resulting beams, and modifying at least one of these resulting beams by a process in the class including pulse stretching and frequency conversion, so that one of the resultant beams is adapted to producing a state of excitation in said members and the other of said resultant beams is of said second type of radiation able to reduce said state of excitation.